Public Safety Communications Advisory Commission
Statewide Interoperability Executive Committee
Interoperable Channels Plan

Arizona Interoperable Channels Plan

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Authority

The Public Safety Communications Advisory Commission (PSCC) is responsible for administering Arizona's interoperability plan.[1]

Purpose

The purpose of this Plan is to establish requirements and/or recommendations for programming of statewide interoperable channels into subscriber units and to provide guidance on the use of the interoperable channels during day-to-day and emergency use.

Scope

This document provides requirements and recommendations for the VHF, UHF and 700 MHz interoperability spectrum.[2] Administration of the interoperable portion of the 800 MHz spectrum is the responsibility of the 800 MHz NPSPAC Arizona Regional Review Committee. Therefore, while 800 MHz interoperability information is included for purposes of providing a complete reference, 800 MHz users are referred to the Arizona 800 MHz Regional Plan (Region 3 PR Docket 91-143) for requirements and recommendations regarding that spectrum band.

Subscriber Programming

Channels

Every portable and mobile radio in Arizona should include the following channels that are within the same band of operation as the basic radio:

- All of the national interoperable channels. These channels, where possible, should be programmed in a distinctly identified area (i.e. zone, bank, deck) of each radio.
- All of the statewide channels belonging to the Arizona Interagency Radio System (AIRS). See the AIRS Standard Operating Procedures (SOP) for programming information.

Due to space limitations in some radios, it may not be possible to program all the interoperable channels into all radios. In that case, consult the Interoperable Channel for each frequency

[1] On December 6, 2001, a letter from DPS Director Dennis Garrett to the Federal Communications Commission notified the FCC that the Arizona Public Safety Communications Committee (now named the Public Safety Communications Advisory Committee or PSCC) would provide executive direction and technical support in planning, creating and administering Arizona's interoperability plan. Accompanying the letter was a memo from Arizona Governor Jane Hull instructing DPS to act on her behalf in this matter.

[2] APCO/NENA General Meeting Minutes from December 9, 2005 and Arizona Statewide Interoperability Committee Meeting Minutes from January 24, 2006 mutually confirm the transfer of coordination for the VHF and UHF bands from APCO to the SIEC and SIEC acceptance of coordination planning for the interoperability channels in the VHF, UHF and 700 MHz bands.

band listed in Appendix A to find the channels prioritized for use in Arizona. Those channels are to be programmed into the radios with the highest priority first, continuing as space permits.

Nomenclature

Standard nomenclature[3] will be used in Arizona and channel displays will be in accordance with that nomenclature. Since simplex channels have different nomenclature than repeated channels, both must be programmed, in lieu of utilizing a Direct or Talk around Button. The channel tables provide the standard eight character nomenclature to be used.[4]

The standardized format for channel names specifies a maximum length of eight characters. The first character is a spectrum band designator (i.e. L, V, U, 7 or 8). The next three or four characters signify the primary purpose of operations on the channel (i.e. CALL, DATA, FIRE, GTAC, LAW, MED, MOB, RAC or TRVL). The next one or two characters provide a unique channel identifier. Finally, a single character may be used to identify a modification to the default operation type on the channel/channel pair (i.e. "D" for direct or talk around use in simplex operations).

Usage

Common Language Protocol

To provide interoperability among first responder agencies at the local, state and national level, only plain English language shall be used when communicating on any interoperability talkgroup or channel. In order to avoid confusion or misunderstanding, 10-codes, incident codes or signals are not to be used on these talkgroups or channels.

Licensing Requirements

The FCC designated national interoperability channels require no separate FCC license for mobile equipment. Mobile Relay (FB2) and Fixed Stations (FB) require FCC licensing.

[3] *APCO/NPSTC ANS 1.104.1-2010: Nomenclature for the Public Safety Interoperability Channels* was approved by the American National Standards Institute (ANSI) on June 9, 2010 and provides a standardized naming format for each Federal Communications Commission (FCC) and National Telecommunications and Information and Administration (NTIA) designated Interoperability Channel in the Public Safety and Federal government Radio Services.

[4] In the case where radios cannot, for technical reasons, support eight character names, a six character name may be used by deleting the first band character and limiting the primary purpose designator to three characters (i.e. CAL, DAT, FIR, and GTC). The six character name may only be used in equipment that is not capable of implementing eight character names.

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Calling Channels

Calling channels are used to contact other users in the region for the purpose of requesting incident related information and assistance, and for setting up tactical communications for specific events. In most cases, the calling party will be asked to move from the calling channel to one of the tactical channels for continuing incident operations or other interoperability communication needs.

Tactical Channels

All Interoperability channels, except as specifically described by frequency band below, shall be used for conventional-only operation. Normally, users will call a communication/command center on one of the calling channels and be assigned an available tactical channel. By FCC rules, the tactical channels are to be used for coordination activity between different agencies in a mutual aid situation. Incidents requiring multi-agency participation will be coordinated over these channels by the agency controlling the incident. In the event of conflict between multiple activities, prioritized use shall occur according to the following levels:

1. Disasters, large scale incidents, or extreme emergencies requiring mutual aid or interagency communications.
2. Incidents where imminent danger exists to life or property.
3. Other incidents requiring the response of multiple agencies.
4. Pre-planned events requiring mutual aid or interagency communications.
5. Incidents involving a single agency where supplemental communications are needed for short term agency use.
6. Drills, tests and exercises.

In the event of multiple simultaneous incidents within the same priority level, interoperability channels should be allocated with the following priorities in mind:

1. Incidents with the greatest level of exigency (e.g., greater threat to life or property, more immediate need) have priority over less exigent incidents.
2. Agencies with single/limited interoperable options have priority use of those options over agencies with multiple interoperable options.
3. When at all possible, agencies already using an interoperable asset during an event should not be redirected to another resource.

In noninterference instances, tactical channels may be used on a case-by-case basis for emergency activities of a single agency.

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National VHF Interoperability Channels/Frequencies

The VHF simplex tactical (TAC) channels are narrowband (12.5 kHz) by definition. Default operation should be carrier squelch receive, CTCSS 156.7(5.A) transmit.

Non-Federal VHF National Interoperability Channels						
Description	**NAME**	**Old AZ-SIEC NAME**	**TX FREQ MHz**	**TX CTCSS Hz**	**RX FREQ MHz**	**RX CTCSS Hz**
Calling	VCALL10	VCALL	155.7525 base/mobile	CSQ / 156.7 (5A)	155.7525	CSQ
Tactical	VTAC11	VTAC1	151.1375 base/mobile	CSQ / 156.7 (5A)	151.1375	CSQ
Tactical	VTAC12	VTAC2	154.4525 base/mobile	CSQ / 156.7 (5A)	154.4525	CSQ
Tactical	VTAC13	VTAC3	158.7375 base/mobile	CSQ / 156.7 (5A)	158.7375	CSQ
Tactical	VTAC14	VTAC4	159.4725 base/mobile	CSQ / 156.7 (5A)	159.4725	CSQ

National UHF Interoperability Channels/Frequencies

The UHF simplex tactical (TAC) channels will be narrowband (12.5 kHz) by definition, effective 01/01/2013. Default operation should be carrier squelch receive, CTCSS 156.7(5A) transmit.

Non-Federal UHF National Interoperability Repeater Channels					
Description	**NAME**	**Old AZ-SIEC Name**	**TX FREQ MHz**	**RX FREQ MHz**	**RX CTCSS Hz**
Calling	UCALL40	UCALL	458.2125	453.2125	CSQ
Calling	UCALL40D	UCALL_D	453.2125	453.2125	CSQ
Tactical	UTAC41	UTAC1	458.4625	453.4625	CSQ
Tactical	UTAC41D	UTAC1_D	453.4625	453.4625	CSQ
Tactical	UTAC42	UTAC2	458.7125	453.7125	CSQ
Tactical	UTAC42D	UTAC2_D	453.7125	453.7125	CSQ
Tactical	UTAC43	UTAC3	458.8625	453.8625	CSQ
Tactical	UTAC43D	UTAC3_D	453.8625	453.8625	CSQ

FCC 700 MHz Public Safety Band

The narrowband (12.5 kHz) voice and data interoperability channels are defined on a nationwide basis. There are two Calling channel sets and 30 Tactical channel sets. Channel sets are comprised of two 6.25 kHz channels each.

700 MHz Calling Channels

Users should first attempt to call in simplex mode. Use 7CALL50D as the primary calling channel and 7CALL70D as the secondary calling channel. Users should next attempt to call in repeater mode, using 7CALL50 first and then 7CALL70. In addition to the usual calling channel functions, the calling channels may be used to notify users when a priority is declared on one or more of the tactical interoperability channels.

Monitoring

700 MHz licensees will be responsible for monitoring interoperable calling channels according to operational guidelines established by the PSCC/SIEC for this function.

Operations

Use the ANSI/TIA 102 Standards (i.e., Project 25 digital protocols) as the Digital Interoperability Standard for the conventional-only mode of operation on the narrowband voice & data interoperability channels[5]

- **Network Access Code (NAC)**: The standard Network Access Code (NAC) $293 should be used for all digital operations on FCC-designated Interoperability Channels where digital modulation is permitted or required.
- **Talk Group:** Use P25 default value for Talk group ID=$0001.
- **Manufacturer's ID:** Use the default value of $00.
- **Designation ID:** Use $FFFFFF (designates everyone)
- **Unencrypted Messages:**
    - **Message ID:** Default ID of $0000000000000000000 (out to 24 zeros)
    - **Algorithm ID:** Default ID of $80
    - **Key ID:** Default key ID of $0000

Mobile relay (repeater) stations that are part of a local, regional, or statewide interoperability network may be equipped with a second receive CTCSS tone to provide local ("in cabinet") mobile relay operation, provided:

[5] Voice and Data Interoperability standards were decided in the 4th R&O in Docket 96-86 and can be found in Part 90 of the Code of Federal Regulations (CFR). Voice I/O standard documents are listed in 90.548(a)(i); data I/O standard documents are listed in 90.548(a)(ii).

- The relay transmitter continues to transmit the Common NAC or $293.
- The relay will accept the common NAC of $293 and present the audio accompanying the $293-coded transmission for automatic in-cabinet repeat or to a live operator at the appropriate controlling dispatch facility.
- The operational configuration of the mobile relay station is published in applicable interoperability resource tracking documents (i.e., TICP,SCIP, FCC-approved Regional Plan) and databases (i.e. CAPRAD, CASM, NIIX).

Encryption

Use of encryption is prohibited on calling channels and permitted on all other interoperability channels. Use of encryption on interoperability channels is generally not recommended.

Deployable Systems

General Public Safety Services Channels labeled 7TAC51 through 7TAC54 and 7TAC71 through 7TAC74 shall be made available for deployable equipment used during disasters and other emergency events that place a heavy, unplanned burden upon in-place radio systems. The PSCC/SIEC shall consider the need for both "deployable trunked" and "deployable conventional" systems and make those channels available to all entities in Arizona.

Trunking on the Interoperability Channels

Trunking the Interoperability channels on a secondary basis shall be limited to operation on eight specific 12.5 kHz channel sets, divided into two subsets of four 12.5 kHz channels. One subset is defined by 7TAC51 through 7TAC54 and the other by 7TAC71 through 7TAC74.

Standard Programming

The listing of the FCC allocations for the narrowband interoperability spectrum and related programming requirements can be found on the Association of Public-Safety Communications Officials – International website at:
http://www.apcointl.com/new/commcenter911/documents/APCO-NPSTC-ANS1-104-1web.pdf

Since the 700 MHz band is new, nearly all equipment is expected to have the capacity to include all of the interoperability channels. In addition, all 700 MHz subscriber radios could be equipped to operate on all of the NPSPAC 800 MHz conventional mutual aid channels in analog mode per the 800 MHz channel table provided.

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Minimum Programming Guide

The table below provides minimum programming requirements for those few 700 MHz Radios with Space Limitations.

Minimum 700 MHz Programming Guide for Radios with Space Limitations

Sorted by Frequency

RECEIVE CHANNEL	TRANSMIT CHANNEL	BASE, MOBILE, OR FIXED (REPEATER OR CONTROL)	ELIGIBILITY / PRIMARY USE	Original NCC Name	**COMMON NAME**	LIMITATIONS (47 CFR Part 9)
769.24375	799.24375	Mobile-Fixed	Calling Channel	7CAL59	**7CALL50**	
	SIMPLEX	Base-Fixed-Mobile			**7CALL50D**	90.531(a)(1)(ii)
769.39375	799.39375	Mobile-Fixed	EMS	7MED60	**7MED65**	
	SIMPLEX	Base-Fixed-Mobile			**7MED65D**	
769.74375	799.74375	Mobile-Fixed	General Public Safety Service	7TAC63	**7TAC55**	
	SIMPLEX	Base-Fixed-Mobile			**7TAC55D**	
769.89375	799.89375	Mobile-Fixed	Fire	7FIR64	**7FIRE63**	
	SIMPLEX	Base-Fixed-Mobile			**7FIRE63D**	
770.24375	800.24375	Mobile-Fixed	General Public Safety Service	7TAC67	**7TAC56**	
	SIMPLEX	Base-Fixed-Mobile			**7TAC56D**	
770.39375	800.39375	Mobile-Fixed	Law Enforcement	7LAW68	**7LAW61**	
	SIMPLEX	Base-Fixed-Mobile			**7LAW61D**	
770.99375	800.99375	Mobile-Fixed	Other Public Service	7TAC73	**7GTAC57**	
	SIMPLEX	Base-Fixed-Mobile			**7GTAC57D**	
773.25625	803.25625	Mobile-Fixed	Calling Channel	7CAL75	**7CALL70**	
	SIMPLEX	Base-Fixed-Mobile			**7CALL70D**	90.531(a)(1)(ii)

FCC 800 MHz National Interoperability Channels

The 800 MHz National Interoperability Channels have a band-width of 20 kHz. Default operation should be carrier squelch receive, CTCSS 156.7(5A) transmit. The calling channel,

8CALL90,[6] is the national calling channel with a designated national CTCSS tone. 8CALL90D is its corresponding direct or talk around channel name. The remaining channels are tactical channels.

The FCC has issued a Report and Order directing the "rebanding" of the 800 MHz spectrum. The result of rebanding will be a contiguous block of frequencies reserved for Public Safety. The rebanding effort has been ongoing since 2005, with the band plan for the U.S.-Mexico border region still under development. The following channel-specific information provides details related to the use of these channels. The frequencies listed in parentheses and followed by an asterisk are 15 MHz lower, and will be the frequency used after Arizona (Region 3) is rebanded.

Non-Federal 800 MHz Mutual Aid Repeater Channels					
DESCRIPTION	**COMMON NAME**	**TX FREQ MHz**	**TX CTCSS Hz**	**RX FREQ MHz**	**RX FREQ MHz**
Calling	8CALL90	821.0125 (806.0125*)	156.7	866.0125	866.0125 (851.0125*)
Calling - Direct	8CALL90D	866.0125 (851.0125*)	156.7	866.0125	866.0125 (851.0125*)
Tactical	8TAC91	821.5125 (806.5125*)	156.7	866.5125	866.5125 (851.5125*)
Tactical - Direct	8TAC91D	866.5125 (851.5125*)	156.7	866.5125	866.5125 (851.5125*)
Tactical	8TAC92	822.0125 (807.0125*)	156.7	867.0125	867.0125 (852.0125*)
Tactical - Direct	8TAC92D	867.0125 (852.0125*)	156.7	867.0125	867.0125 (852.0125*)
Tactical	8TAC93	822.5125 (807.5125*)	156.7	867.5125	867.5125 (852.5125*)
Tactical - Direct	8TAC93D	867.5125 (852.5125*)	156.7	867.5125	867.5125 (852.5125*)
Tactical	8TAC94	823.0125 (808.0125*)	156.7	868.0125	868.0125 (853.0125*)
Tactical - Direct	8TAC94D	868.0125 (853.0125*)	156.7	868.0125	868.0125 (853.0125*)

[6] 8CALL90 is identical to the statewide AIRSAZ Channel in the Arizona Interagency Radio System (AIRS). Because the National Interoperability Channels should be programmed in a distinctly identified area (zone, bank, deck) of each radio, this channel should be programmed twice. See the AIRS Standard Operating Procedures document for documentation related to programming and use of this channel as a statewide interoperability resource.

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Appendix A
(Currently Under Development)